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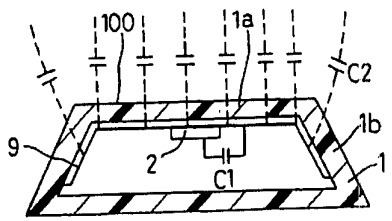
(54)【発明の名称】　便座用着座検出装置

(57)【要約】
【課題】十分な電気絶縁性や耐水性を要求される検出電極板を感度の低下を招くことなく小型化でき、更に着座面の加温性にも優れた便座用着座検出装置を提供すること。
【解決手段】便座内部において、金属伝熱板９３はフローティング電位とされるので、十分な電気絶縁性や耐水性を要求される検出電極板２を、感度の低下を招くことなく小型化でき、更に着座面の加温性にも優れた便座用着座検出装置を実現することができる。






【特許請求の範囲】
【請求項１】外主面が着座面をなし内部にキャビティを有する便座と、前記着座面に近接して前記便座内に敷設された便座加熱用の発熱体と、前記発熱体に対して電気絶縁されつつ少なくとも前記着座面に平行して前記便座内に延設される良伝熱性の金属伝熱板と、前記金属伝熱板より小型に形成されるとともに前記金属伝熱板に対して電気絶縁されつつ前記便座内に配設される着座検出用の検出電極板と、前記検出電極板を一方の電極とする静電容量変化を検出して前記着座面への着座を検出する回路部とを備える便座用着座検出装置において、
前記金属伝熱板は、浮遊電位を有することを特徴とする便座用着座検出装置。
【請求項２】請求項１記載の便座用着座検出装置において、
前記金属伝熱板は、前記便座の外表面と前記検出電極板との間に介設されることを特徴とする便座用着座検出装置。
【請求項３】請求項１記載の便座用着座検出装置において、
前記検出電極板は、前記金属伝熱板の便座回動軸側の端部に近接して配設されることを特徴とする便座用着座検出装置。
【請求項４】請求項１記載の便座用着座検出装置において、
前記検出電極板は、前記着座面の側部に近接配置されることを特徴とする便座用着座検出装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、便座用着座検出装置に関する。
【０００２】
【従来の技術】従来の便座用着座検出装置の一例を図７に示す。便座１の内部は空洞となっており、便座１の上板部１ａの上面が着座面１００を構成している。便座１の上板部１ａ及び側板部１ｂの内面にはヒータ９が接着されている。ヒータ９は、図８に示すように、電熱線部（発熱体）９１とそれを被覆する絶縁樹脂部９２と、絶縁樹脂部９２２の一主面に接着されたシールド電極箔９３とからなり、シールド電極箔９３が接着剤により便座１の上板部１ａ及び側板部１ｂの内面に貼着されている。このシールド電極箔９３は、通電により発熱する電熱線部９１の発生熱を便座１の着座面１００全体に伝達する機能とともに、着座面１００への人体の着座を検出するための検出電極板としての機能を兼ねている。
【０００３】着座面１００への着座は、このシールド電極箔９３の静電容量の変化を生じさせるので、シールド電極箔９３に高周波電圧を印加してこのシールド電極箔９３と大地との間の静電容量変化を電気的に検出することにより、着座が検出される。従来の便座用着座検出装置の他例を図９を参照して説明する。
【０００４】この従来例では、便座１の上板部１ａの内面とヒータ９との間に専用の検出電極板２を介装したものであり、検出電極板２は、図１０に示すように絶縁樹脂層２１により被覆されて、接地電位のシールド電極箔９３から絶縁分離されている。着座面１００への着座は、図７の場合と同様に、この検出電極板２の静電容量の変化を生じさせるので、検出電極板２に高周波電圧を印加してこの検出電極板２と大地との間の静電容量変化を電気的に検出することにより、着座が検出される。
【０００５】
【発明が解決しようとする課題】しかしながら、上記した図７に示す従来の便座用着座検出装置では、検出電極板をなすシールド電極箔９３と電熱線部９１との間の静電容量が大きいので、電熱線部９１の通電電圧（通常商用交流電圧）に重畳する高周波ノイズ電圧、特にその着座信号電圧の帯域成分が、着座判定動作の誤動作を招く可能性を高めるという問題を有していた。更に、大面積のシールド電極箔９３を接地電位から浮かせるためにその全面にわたって十分に電気絶縁し、防水なければならないという問題もあった。
【０００６】一方、図９に示す従来の便座用着座検出装置では、シールド電極箔９３と着座面１００との間に専用の検出電極板２を設けるので、シールド電極箔９３を接地しておけば電熱線部９１から検出電極板２への高周波電磁ノイズ電圧の混入は防止できるという利点を持つ。しかし、電熱線部９１の発熱の伝達を考える場合、全面にわたって電気絶縁される検出電極板２の存在が、この領域における着座面１００の温度上昇速度の緩慢化を招くという問題、更に、検出電極板２が小型であるので検出感度が低下するという問題点を持っていた。
【０００７】従って、本発明は、十分な電気絶縁性や耐水性を要求される検出電極板を感度の低下を招くことなく小型化でき、更に着座面の加温性にも優れた便座用着座検出装置を提供することを、その目的としている。
【０００８】
【課題を解決するための手段】本発明の第１の構成によれば、便座内部において、金属伝熱板はフローティング電位とされる。このようにすれば、十分な電気絶縁性や耐水性を要求される検出電極板を、感度の低下を招くことなく小型化でき、更に着座面の加温性にも優れた便座用着座検出装置を実現することができる。
【０００９】更に説明すると、検出電極板は金属伝熱板に近接配置されているので、検出電極板と金属伝熱板との間の静電容量Ｃ１は大きく設定できる。また、金属伝熱板は着座面に対して近接するとともに大きな対面面積をもつので、着座面に着座した人体に対して極めて大きな静電容量Ｃ２を持つ。そこで、金属伝熱板を浮遊電位とすれば、検出電極板は着座した人体に対して大きな静電容量Ｃｓ（＝１／（（１／Ｃ１）＋（１／Ｃ２））を

もつことができ、その結果として、検出電極板を小型とするにもかかわらず、良好な検出感度を得ることができる。なお、金属伝熱板は、浮遊電位とされ、検出電極板のように直流的に一定電位に固定される必要がないので、その絶縁は簡単（たとえば便座内に露出）で構わない。要するに、金属伝熱板は着座検出に用いられる高周波帯域で大地に対して高インピーダンスを持てばよい。

【００１０】この結果、検出電極板を金属伝熱板の任意の箇所に近接させるだけで着座検出ができることがわかる。従って、検出電極板の配設位置を選択することができて便座内部構造の設計自由度が増し、便座内部での配線の引き回しの自由度が増大し、検出感度の低下を招くことなく検出電極板の小型化を実現でき、検出電極板を着座面と発熱体との間から排除することにより着座面の加温性も向上する事ができる。

【００１１】本発明の第２の構成によれば上記第１の構成において更に、金属伝熱板が便座の外表面と検出電極板との間に介設される。このようにすれば、上記第１の構成の作用効果に加えて特に、着座面の加温性に優れた便座用着座検出装置を実現することができる。本発明の第３の構成によれば上記第１の構成において更に、検出電極板が金属伝熱板の便座回動軸側の端部に近接して配設される。

【００１２】このようにすれば上記第１の構成の作用効果に加えて更に、検出電極板と外部の電子回路装置との接続線の長さを短縮してその寄生容量を低減し、着座前後における静電容量変化を増大するとともに、この接続線の配線位置のばらつきによるこの接続線と人体との間の上記寄生容量のばらつきを低減してそれによる悪影響を低減することができる。また、配線費用も低減することができる。

【００１３】本発明の第４の構成によれば上記第１の構成において更に、検出電極板が着座面の側部に近接配置される。このようにすれば、検出電極板が便座の着座面（上面）と金属伝熱板との間に介在しないので、着座面の加温性に優れた便座用着座検出装置を実現することができる。

【００１４】

【発明の実施の形態】検出電極板は発振回路部とともに発振回路系を構成する事ができる。この場合、検出電極板の大地静電容量の変化により発振回路系に発振とその停止との状態変化を生じさせても良い。又は、検出電極板の大地静電容量の変化により発振回路系の発振周波数の変化を生じさせても良い。前者の場合、着座検出回路部は入力交流信号電圧の振幅変化により着座の有無を判定する。後者の場合、着座検出回路部は入力交流信号電圧の周波数変化により着座の有無を判定する。

【００１５】また、発振回路部は一定周波数、一定振幅の高周波電圧を一定のインピーダンスの素子を通じて検出電極板に印加することもできる。このようにすれば、検出電極板の静電容量変化に応じて、検出電極板の電位振幅が変化するので、それを検出することにより着座の有無を検出することができる。

【００１６】

【実施例】以下、本発明に係る便座用着座検出装置を図示の実施例により具体的に説明する。この実施例の便座用着座検出装置を図１に示す。１は便座、２は便座１の内部に配設された着座検出用の検出電極板であり、アルミ箔からなる。３はコントロールボックス、４は便座１とコントロールボックス３とを接続する樹脂パイプ、５はコントロールボックス３内に設けられたコントローラであり、便座１に内設されたヒータ９などの他の装置の制御も行っている。樹脂パイプ４内には、同軸ケーブル６が敷設されており、同軸ケーブル６の芯線の一端はコントローラ５に接続され、その他端は検出電極板２に接続されている。また、同軸ケーブル６の外側導体はコントローラ５の接地電極に接続されている。

【００１７】この便座用着座検出装置の回路図を図２に示す。図２において、６１は同軸ケーブル６の芯線、６２は同軸ケーブル６の外側導体である。コントローラ５は、発振回路（本発明でいう発振回路部）６、着座検出回路部７、結合トランス８、リアクタンス素子１３、１４、ダイオード回路１５、コンデンサ１６を有している。リアクタンス素子１３はたとえばフェライトビーズや空洞コイルからなる。

【００１８】８１は結合トランス８の一次コイル、８２はその二次コイルである。７１は検波平滑回路、７２は増幅回路、７３はＡ／Ｄコンバータ、７４はマイクロコンピュータである。以下、コントローラ５の回路構成及びその動作を更に詳しく説明する。コンデンサ１６は結合トランス８の一次コイル８１のインダクタンスとで発振回路６の発振周波数で共振するように作製されている。結合トランス８の二次コイル８２はリアクタンス素子１３、同軸ケーブル６の芯線６１を通じて検出電極板２に接続され、発振回路６から出力された上記周波数の高周波電圧は、検出電極板２に印加されている。

【００１９】また、検出電極板２の大地間の静電容量Ｃｓは、便座１に人が着座していない状態（以下、非着座状態という）において、結合トランス８の二次コイル８２及びリアクタンス素子１３、１４とで発振回路６の発振周波数をほぼ共振周波数とするように作製されている。結合トランス８の二次コイル８２の一端は接地され、二次コイル８２の他端とリアクタンス素子１３との接続点はリアクタンス素子１３を通じて接地されている。また、二次コイル８２の他端とリアクタンス素子１３との接続点の電位は、着座検出信号として検波平滑回路７１で検波平滑されて直流信号電圧に変換された後、増幅回路７２で電圧増幅され、増幅された直流信号電圧のレベルはＡ／Ｄコンバータ７３でデジタル信号にＡ／Ｄ変換されて、マイクロコンピュータ７４に入力され、





マイクロコンピュータ７４は、この入力デジタル信号が所定レベル以上であれば非着座状態であると判定する。ダイオード回路１５は直列接続されたダイオード１５１～１５３をもち、上記着座検出信号をなす電圧（着座検出信号電圧）のクランプを行うとともに、検出電極板２の直流電位を規定している。

【００２０】結局、検出電極板２、リアクタンス素子１３、１４及び結合トランス８からなる結合トランス８の二次側の回路は、非着座状態において共振状態にあり、大きな電流が流れ、その結果、検波平滑回路７１には大きな高周波電圧が入力されていることになる。ここで、人が便座１に着座すると、擬似的に大地と仮定できる人体と検出電極板２との間の静電容量の付加により検出電極板２の静電容量が非着座状態よりも増大し、これにより上記結合トランス８の二次側の回路の共振周波数は発振回路６の発振周波数からずれ、これにより検波平滑回路７１に入力される着座検出信号電圧が減少し、マイクロコンピュータ７４が着座検出を行う。

【００２１】次に、本実施例の特徴をなす便座１内の電極構造について図３を参照して説明する。便座１の内部は空洞となっており、便座１の上板部１ａの上面が着座面１００を構成している。便座１の上板部１ａ及び側板部１ｂの内面にはヒータ９が接着されている。ヒータ９は、図４に示すように、電熱線部（発熱体）９１とそれを被覆する絶縁樹脂部９２と、絶縁樹脂部９２の主面に接着されたシールド電極箔（金属伝熱板）９３とからなる。このシールド電極箔９３は、通電により発熱する電熱線部９１の発生熱を便座１の着座面１００全体に伝達する機能をもつが、本実施例において重要な点はシールド電極箔９３が浮遊電位とされている点にある。

【００２２】便座１の上板部１ａの直下にはヒータ９の裏側に位置して検出電極板２が設けられている。検出電極板２は、図１０と同じ断面構造をもち、絶縁樹脂層２１によりその全面を被覆されている。絶縁樹脂層２１は検出電極板２をヒータ９から電気絶縁している。なお、絶縁樹脂層２１の内主面にすなわちキャビティに露出する主面にシールド電極箔を設けて、このシールド電極箔をヒータ９のシールド電極箔９３と電気的に短絡すれば、シールド電極箔９３と検出電極板２との間の静電容量Ｃ１を一層増大して感度向上を図ることができる。

【００２３】着座面１００への着座は、人体（図示せず）とシールド電極箔（金属伝熱板）９３との間の静電容量Ｃ２を増大させる。シールド電極箔９３は浮遊電位であるので、静電容量Ｃ２の増大は、検出電極板２は着座した人体との間の静電容量Ｃｓ（＝１／（（１／Ｃ１）＋（１／Ｃ２））を増加させ、これにより、上述のように着座を判別することができる。

【００２４】従って、この実施例によれば、検出電極板２を小型とするにもかかわらず、良好な検出感度を得ることができる。また、この小型の検出電極板２の配設位置もシールド電極箔９３に近接する範囲で自由に変更する事ができる。更に、検出電極部２００がヒータ９の裏側に配設されることになるので、ヒータ９による便座１の便座面１００の加熱の障害となることがない。更に、この実施例によれば、図１に示すように、検出電極板２は、ヒータ９のシールド電極箔（金属伝熱板）９３の便座回動軸側の端部に近接して配設される。このようにすれば感度を低下することなく、同軸ケーブル６の長さの短縮を実現し、その寄生容量を低減することができる。

（実施例２）他の実施例を図５を参照して説明する。

【００２５】この実施例の便座用着座検出装置は、実施例１の便座用着座検出装置（図３、図４参照）において、検出電極板２を、便座１の側板部１ｂ近傍にずらせて配設したものである。このようにすれば、検出電極板２の配設が簡単となり。同軸ケーブル６の引き回し自由度も向上する。なお、検出電極板２は、図６のように、ヒータ９と便座１の側板部１ｂとの間に配設されても良い。即ち、この場合でも、便座１の上板部１ａの上面からなる着座面１００とヒータ９との間に検出電極板２が介在することがないので、着座面１００の加熱性が低下することがない。

（変形実施態様）上記各実施例では、ヒータ９内において、電熱線部９１は図４に示すようにシールド電極箔９３よりも検出電極板２から遠い配置とされているが、逆の位置構成としてもよいことは明白である。

【００２６】また、結合トランス８の二次側の回路の共振周波数の発振回路６の発振周波数より高く設定しておき、着座により静電容量Ｃｓが増大し、結合トランス８の二次側の回路の共振周波数が低下して発振回路６の発振周波数に一致するように設定しても良い。この場合には、マイクロコンピュータ７４に入力される信号電圧のレベルと着座状態との関係が上記と反対となる。

【００２７】その他、発振回路６、結合トランス８及び検出電極板２を含む回路が発振回路部を構成して、着座の有無による静電容量Ｃｓの変化に応じてこの発振回路部の発振、発振停止を行わせて、それをマイクロコンピュータ７４で判定しても良い。更に、同様に、発振回路６、結合トランス８及び検出電極板２を含む回路が発振回路部を構成して、着座の有無による静電容量Ｃｓの変化に応じてこの発振回路部の発振周波数を変更し、それをマイクロコンピュータ１２で判定しても良い。

【図面の簡単な説明】

【図１】本発明に係る便座用着座検出装置の実施例を示す模式斜視図である。

【図２】図１の便座用着座検出装置の回路図である。

【図３】図１の便座の一部断面を示す断面図である。

【図４】図３の便座の検出電極部２００の拡大断面を示す断面図である。

【図５】他の実施例の便座の一部断面を示す断面図である。

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【図6】他の実施例の便座の一部断面を示す断面図である。
【図7】従来の便座用着座検出装置の一例を示す模式斜視図である。
【図8】図8の便座の一部断面を示す断面図である。
【図9】従来の便座用着座検出装置の他例を示す模式斜視図である。

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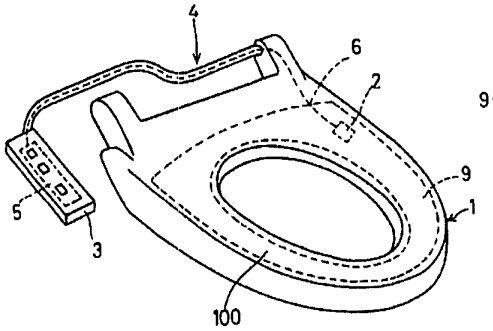
【図10】図9の便座の一部断面を示す断面図である。
【符号の説明】
1…便座、2…検出電極板、5…コントローラ、9はヒータ、91は電熱線部（発熱体）、93はシールド電極箔。

【図1】

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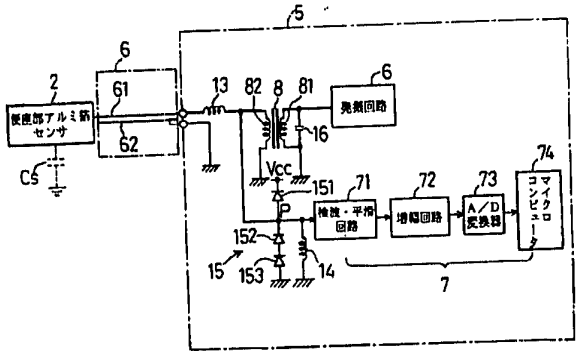
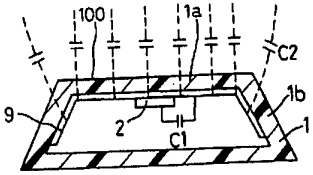



【図3】

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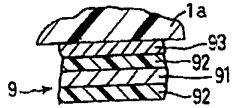
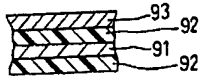
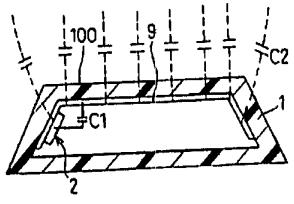



【図8】

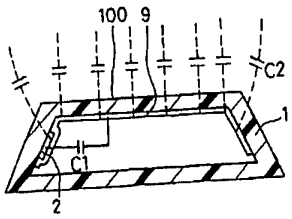



【図10】


【図5】

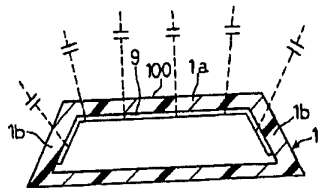



【図6】

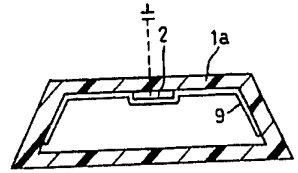





【図7】




【図9】



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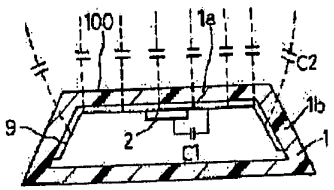
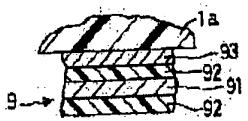
SATO KENICHI

## (54) TOILET SEAT SITTING DETECTOR

(57)Abstract:
PROBLEM TO BE SOLVED: To miniaturize a detection electrode plate and increase the warming property of a sitting surface, by providing the inside of a toilet seat with a metal heat transmission plate as floating potential, relating to a detector detecting sitting on the sitting surface from detection of capacitance variance in which a detection electrode plate is made as one pole.
SOLUTION: The inside of a toilet seat 1 is made to be hollow and, onto the inner plane of the upper board part 1a and side board part 1b of the toilet seat 1 forming a sitting plane 100, a heater 9 is attached. The heater 9 consists of an electric heating wire (heat emitter) 91, insulation resin 92 and shield electrode foil (metal heat transmission plate) 93 which is made to be floating potential. Right under the upper board part 1a, a detection electrode plate 2 is provided to be located on the reverse side of the heater 9, the detection electrode plate 2 is electrically insulated from the heater 9 by means of an insulation resin layer. Further, on the chief inner plane of the insulation resin layer, shield electrode foil is provided, which is short-circuited with the shield electrode foil 93; thus, an enhanced sensitivity is attempted by increasing capacitance C1 between the electrode foil 93 and the detection electrode plate 2.

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JP,10-262870,A [CLAIMS]

* NOTICES *



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CLAIMS

[Claim(s)]
[Claim 1] The heating element for seat heating which the outside principal plane approached the seat which has a cavity for a taking-a-seat side inside nothing, and said taking-a-seat side, and was laid in said seat, The metal heat exchanger plate of right heat-conducting characteristic installed in said seat in parallel with said taking-a-seat side at least, electric insulation being carried out to said heating element, The detection electrode plate for taking-a-seat detection arranged in said seat, electric insulation being carried out to said metal heat exchanger plate while being formed in small from said metal heat exchanger plate, It is taking-a-seat detection equipment for the seats characterized by said metal heat exchanger plate having floating potential in the taking-a-seat detection equipment for the seats equipped with the circuit section which detects electrostatic-capacity change which uses said detection electrode plate as one electrode, and detects taking a seat to said taking-a-seat side.
[Claim 2] It is taking-a-seat detection equipment for the seats characterized by interposing said metal heat exchanger plate between the outside surface of said seat, and said detection electrode plate in the taking-a-seat detection equipment for the seats according to claim 1.
[Claim 3] It is taking-a-seat detection equipment for the seats characterized by for said detection electrode plate approaching the edge by the side of the seat rotation shaft of said metal heat exchanger plate in the taking-a-seat detection equipment for the seats according to claim 1, and being arranged.
[Claim 4] It is taking-a-seat detection equipment for the seats characterized by carrying out contiguity arrangement of said detection electrode plate at the flank of said taking-a-seat side in the taking-a-seat detection equipment for the seats according to claim 1.

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[Translation done.]

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the taking-a-seat detection equipment for the seats.
[0002]
[Description of the Prior Art] An example of the conventional taking-a-seat detection equipment for the seats is shown in drawing 7 . The interior of the seat 1 serves as a cavity, and the top face of superior lamella section 1a of the seat 1 constitutes the taking-a-seat side 100. The heater 9 has pasted the inside of superior lamella section 1a of the seat 1, and side plate section 1b. A heater 9 consists of the heating-wire section (heating element) 91, the insulating resin section 92 which covers it, and a screening-electrode foil 93 pasted up on one principal plane of the insulating resin section 922, as shown in drawing 8 , and the screening-electrode foil 93 is stuck on the inside of superior lamella section 1a of the seat 1, and side plate section 1b by adhesives. This screening-electrode foil 93 serves as the function as a detection electrode plate for detecting taking a seat of the body to the taking-a-seat side 100 with the function to transmit the generating heat of the heating-wire section 91 which generates heat by energization to the taking-a-seat side 100 whole of the seat 1.
[0003] Since taking a seat to the taking-a-seat side 100 produces change of the electrostatic capacity of this screening-electrode foil 93, taking a seat is detected by impressing high-frequency voltage to the screening-electrode foil 93, and detecting electrically the electrostatic-capacity change between this screening-electrode foil 93 and earth. The other examples of the conventional taking-a-seat detection equipment for the seats are explained with reference to drawing 9 .
[0004] In this conventional example, the detection electrode plate 2 of dedication is infixed between the inside of superior lamella section 1a of the seat 1, and a heater 9, and the detection electrode plate 2 is covered with the insulating resin layer 21 as shown in drawing 10 , and insulating separation is carried out from the screening-electrode foil 93 of touch-down potential. Since taking a seat to the taking-a-seat side 100 produces change of the electrostatic capacity of this detection electrode plate 2 like the case of drawing 7 , when it impresses high-frequency voltage to the detection electrode plate 2 and detects electrically the electrostatic-capacity change between this detection electrode plate 2 and earth, taking a seat is detected.
[0005]
[Problem(s) to be Solved by the Invention] However, with the conventional taking-a-seat detection equipment for the seats shown in above-mentioned drawing 7 , since the electrostatic capacity between the screening-electrode foils 93 and the heating-wire sections 91 which make a detection electrode plate be large, it had the RF noise electrical potential difference superimposed on the energization electrical potential difference ( usually commercial alternating current electrical potential difference) of the heating-wire section 91, and the problem that where of the band component of the taking-a-seat signal level raised especially possibility cause malfunction of taking-a-seat judging actuation. furthermore, in order to float from touch-down potential, electric insulation of the screening-electrode foil 93 of a large area was fully carried





out over the whole surface, and there was also a problem that it would not become if there is no waterproofing.
[0006] since the detection electrode plate 2 of dedication is formed between the screening-electrode foil 93 and the taking-a-seat side 100, if the screening-electrode foil 93 is grounded on the other hand with the conventional taking-a-seat detection equipment for the seats shown in drawing 9 -- the RF from the heating-wire section 91 to the detection electrode plate 2 -- electromagnetism -- mixing of a noise electrical potential difference has the advantage that it can prevent. However, when transfer of generation of heat of the heating-wire section 91 was considered, since the detection electrode plate 2 was still smaller, the existence of the detection electrode plate 2 by which electric insulation is carried out over the whole surface had the problem of causing slow-ization of the rate of temperature rise of the taking-a-seat side 100 in this field, and the trouble that detection sensitivity fell.
[0007] therefore -- without this invention invites the detection electrode plate of which sufficient electric insulation and a sufficient water resisting property are required for the fall of sensibility -- it can miniaturize -- further -- warming of a taking-a-seat side -- it sets it as the purpose to offer the taking-a-seat detection equipment for the seats excellent also in the sex.
[0008]
[Means for Solving the Problem] According to the 1st configuration of this invention, let a metal heat exchanger plate be floating potential in the interior of the seat. thus -- if it carries out, without it will invite the detection electrode plate of which sufficient electric insulation and a sufficient water resisting property are required for the fall of sensibility -- it can miniaturize -- further -- warming of a taking-a-seat side -- the taking-a-seat detection equipment for the seats excellent also in the sex is realizable.
[0009] Furthermore, if it explains, since contiguity arrangement of the detection electrode plate is carried out at the metal heat exchanger plate, the electrostatic capacity C1 between a detection electrode plate and a metal heat exchanger plate can be set up greatly. Moreover, since a metal heat exchanger plate has a big confrontation area while approaching to a taking-a-seat side, it has the very big electrostatic capacity C2 to the body which sat down to the taking-a-seat side. Then, it is the big electrostatic capacity Cs (it can have =1/(1 / C1) (+ (1 / C2)), and as the result, in spite of making a detection electrode plate small, good detection sensitivity can be obtained.) to the body with which floating potential, then a detection electrode plate sat down the metal heat exchanger plate. In addition, since a metal heat exchanger plate does not have to be made into floating potential and it does not need to be fixed to fixed potential in direct current like a detection electrode plate, easy (it exposes for example, in the seat) is sufficient as the insulation. In short, a metal heat exchanger plate should just have a high impedance to the earth in the high frequency band used for taking-a-seat detection.
[0010] Consequently, it turns out that taking-a-seat detection can be performed only by making a detection electrode plate approach the part of the arbitration of a metal heat exchanger plate. therefore, the thing for which the arrangement location of a detection electrode plate can be chosen, the degree of freedom of leading about of wiring inside the increase of the design degree of freedom of a seat internal structure and the seat increases, the miniaturization of a detection electrode plate can be realized, without causing the fall of detection sensitivity, and a detection electrode plate is eliminated from between a taking-a-seat side and heating elements -- warming of a taking-a-seat side -- a sex can also improve.
[0011] According to the 2nd configuration of this invention, in the 1st configuration of the above, a metal heat exchanger plate is further interposed between the outside surface of the seat, and a detection electrode plate. thus -- if it carries out -- the operation effectiveness of the configuration of the above 1st -- adding -- especially -- warming of a taking-a-seat side -- the taking-a-seat detection equipment for the seats excellent in the sex is realizable. According to the 3rd configuration of this invention, in the 1st configuration of the above, a detection electrode plate is further approached and arranged in the edge by the side of the seat rotation shaft of a metal heat exchanger plate.
[0012] If it does in this way, while in addition to the operation effectiveness of the configuration of the above 1st shortening the die length of the path cord of a detection electrode plate and

external electronic-circuitry equipment further, reducing that parasitic capacitance and increasing the electrostatic-capacity change before and behind taking a seat, dispersion in the above-mentioned parasitic capacitance between this path cord and body by dispersion in the wiring location of this path cord can be reduced, and the bad influence by it can be reduced. Moreover, wiring costs can also be reduced.

[0013] According to the 4th configuration of this invention, in the 1st configuration of the above, contiguity arrangement of the detection electrode plate is carried out further at the flank of a taking-a-seat side. thus -- if it carries out, since a detection electrode plate does not intervene between the taking-a-seat side (top face) of the seat, and a metal heat exchanger plate -- warming of a taking-a-seat side -- the taking-a-seat detection equipment for the seats excellent in the sex is realizable.

[0014]

[Embodiment of the Invention] A detection electrode plate can constitute an oscillator-circuit system with the oscillator-circuit section. In this case, an oscillator-circuit system may be made to produce the change of state of an oscillation and its halt by change of the earth electrostatic capacity of a detection electrode plate. Or change of the oscillation frequency of an oscillator-circuit system may be produced by change of the earth electrostatic capacity of a detection electrode plate. In the case of the former, the taking-a-seat detector section judges the existence of taking a seat by amplitude change of an input alternating current signal level. In the case of the latter, the taking-a-seat detector section judges the existence of taking a seat by frequency change of an input alternating current signal level.

[0015] Moreover, the oscillator-circuit section can also impress the high-frequency voltage of constant frequency and the fixed amplitude to a detection electrode plate through the component of a fixed impedance. If it does in this way, since the potential amplitude of a detection electrode plate will change according to electrostatic-capacity change of a detection electrode plate, the existence of taking a seat is detectable by detecting it.

[0016]

[Example] Hereafter, the example of illustration explains concretely the taking-a-seat detection equipment for the seats concerning this invention. The taking-a-seat detection equipment for the seats of this example is shown in drawing 1 . It is the detection electrode plate for taking-a-seat detection with which 1 was arranged by the seat and 2 was arranged in the interior of the seat 1, and consists of aluminum foil. The resin pipe to which 3 connects a control box to and 4 connects the seat 1 and a control box 3, and 5 are the controllers formed in the control box 3, and control of other equipments, such as the heater 9 installed inside by the seat 1, is also performed. The coaxial cable 6 is laid in the resin pipe 4, the end of the core wire of a coaxial cable 6 is connected to a controller 5, and the other end is connected to the detection electrode plate 2. moreover, the outside of a coaxial cable 6 -- the conductor is connected to the earth electrode of a controller 5.

[0017] The circuit diagram of this taking-a-seat detection equipment for the seats is shown in drawing 2 . drawing 2 -- setting -- 61 -- the core wire of a coaxial cable 6, and 62 -- the outside of a coaxial cable 6 -- it is a conductor. The controller 5 has an oscillator circuit (oscillator-circuit section as used in the field of this invention) 6, the taking-a-seat detector section 7, the joint transformer 8, reactive elements 13 and 14, the diode circuit 15, and the capacitor 16. A reactive element 13 consists of a ferrite bead or a cavernous coil.

[0018] 81 is the primary coil of the joint transformer 8, and 82 is the secondary coil. For 71, as for an amplifying circuit and 73, a detection smoothing circuit and 72 are [ an A/D converter and 74 ] microcomputers. Hereafter, the circuitry of a controller 5 and its actuation are explained in more detail. The capacitor 16 is produced so that it may resonate on the oscillation frequency of an oscillator circuit 6 with the inductance of the primary coil 81 of the joint transformer 8. The secondary coil 82 of the joint transformer 8 is connected to the detection electrode plate 2 through a reactive element 13 and the core wire 61 of a coaxial cable 6, and the high-frequency voltage of the above-mentioned frequency outputted from the oscillator circuit 6 is impressed to the detection electrode plate 2.

[0019] Moreover, in the condition (henceforth the condition of not sitting down) that people have





not sat down to the seat 1, the electrostatic capacity Cs between the earths of the detection electrode plate 2 is produced so that the oscillation frequency of an oscillator circuit 6 may be mostly made into resonance frequency by the secondary coil 82 and reactive elements 13 and 14 of the joint transformer 8. The end of the secondary coil 82 of the joint transformer 8 is grounded, and the node of the other end of a secondary coil 82 and a reactive element 13 is grounded through the reactive element 13. Moreover, after detection smooth [ of the potential of the node of the other end of a secondary coil 82 and a reactive element 13 ] is carried out as a taking-a-seat detecting signal in the detection smoothing circuit 71 and it is transformed into a direct current signal electrical potential difference, the voltage of it is amplified in an amplifying circuit 72, and A/D conversion of the level of the amplified direct current signal electrical potential difference is carried out to a digital signal by A/D converter 73, and it is inputted into a microcomputer 74, and judges with a microcomputer 74 being in the condition of not sitting down, if this input digital signal is more than predetermined level. The diode circuit 15 had the diodes 151-153 by which series connection was carried out, and while clamping the electrical potential difference (taking-a-seat detection signal level) which makes the above-mentioned taking-a-seat detecting signal, the direct-current potential of the detection electrode plate 2 is specified.

[0020] The secondary circuit of the joint transformer 8 which consists of the detection electrode plate 2, reactive elements 13 and 14, and a joint transformer 8 is in the resonance state in the condition of not sitting down, after all, and a big current will flow, consequently big high-frequency voltage will be inputted into the detection smoothing circuit 71. If people sit down to the seat 1, the electrostatic capacity of the detection electrode plate 2 will increase rather than the condition of not sitting down here, by addition of the electrostatic capacity between the bodies and the detection electrode plates 2 which can be assumed to be the earth in false. Thereby, the resonance frequency of the secondary circuit of the above-mentioned joint transformer 8 shifts from the oscillation frequency of an oscillator circuit 6, the taking-a-seat detection signal level inputted into the detection smoothing circuit 71 by this decreases, and a microcomputer 74 performs taking-a-seat detection.

[0021] Next, the electrode structure in the seat 1 which makes the description of this example is explained with reference to drawing 3 . The interior of the seat 1 serves as a cavity, and the top face of superior lamella section 1a of the seat 1 constitutes the taking-a-seat side 100. The heater 9 has pasted the inside of superior lamella section 1a of the seat 1, and side plate section 1b. A heater 9 consists of the heating-wire section (heating element) 91, the insulating resin section 92 which covers it, and a screening-electrode foil (metal heat exchanger plate) 93 pasted up on the principal plane of the insulating resin section 92, as shown in drawing 4 . Although this screening-electrode foil 93 has the function to transmit the generating heat of the heating-wire section 91 which generates heat by energization to the taking-a-seat side 100 whole of the seat 1, in this example, an important point is in the point that the screening-electrode foil 93 is made into floating potential.

[0022] It is located directly under superior lamella section 1a of the seat 1 on the background of a heater 9, and the detection electrode plate 2 is formed. The detection electrode plate 2 has the same cross-section structure as drawing 10 , and is having the whole surface covered with the insulating resin layer 21. The insulating resin layer 21 is carrying out electric insulation of the detection electrode plate 2 from the heater 9. In addition, if a screening-electrode foil is formed in the principal plane exposed to the inner principal plane of the insulating resin layer 21, i.e., a cavity, and this screening-electrode foil is electrically connected with the screening-electrode foil 93 of a heater 9 too hastily, the electrostatic capacity C1 between the screening-electrode foil 93 and the detection electrode plate 2 is increased further, and improvement in sensibility can be aimed at.

[0023] Taking a seat to the taking-a-seat side 100 increases the electrostatic capacity C2 between the body (not shown) and the screening-electrode foil (metal heat exchanger plate) 93. Increase of electrostatic capacity C2 is the electrostatic capacity Cs between the bodies with which the detection electrode plate 2 sat down since the screening-electrode foil 93 was floating potential (= 1/(1 / C1) (+ (1 / C2)) is made to increase, and, thereby, taking a seat can be

distinguished as mentioned above.).
[0024] Therefore, according to this example, in spite of making the detection electrode plate 2 small, good detection sensitivity can be obtained. Moreover, the arrangement location of this small detection electrode plate 2 can also be freely changed in the range close to the screening-electrode foil 93. Furthermore, since the detection polar zone 200 will be arranged in the background of a heater 9, it does not become the failure of heating of the seat side 100 of the seat 1 at a heater 9. Furthermore, according to this example, as shown in drawing 1 , the detection electrode plate 2 is approached and arranged in the edge by the side of the seat rotation shaft of the screening-electrode foil (metal heat exchanger plate) 93 of a heater 9. Without falling sensibility, if it does in this way, compaction of the die length of a coaxial cable 6 can be realized, and the parasitic capacitance can be reduced.
(Example 2) others -- an example is explained with reference to drawing 5 .
[0025] In the taking-a-seat detection equipment for the seats of an example 1 (refer to drawing 3 and drawing 4 ), the taking-a-seat detection equipment for the seats of this example can shift the detection electrode plate 2 near the side plate section 1b of the seat 1, and arranges it. If it does in this way, arrangement of the detection electrode plate 2 will be an easy next door. The leading-about degree of freedom of a coaxial cable 6 also improves. In addition, the detection electrode plate 2 may be arranged between a heater 9 and side plate section 1b of the seat 1 like drawing 6 . That is, since the detection electrode plate 2 does not intervene even in this case between the taking-a-seat sides 100 and heaters 9 which consist of a top face of superior lamella section 1a of the seat 1, the heating nature of the taking-a-seat side 100 does not fall.
(Deformation embodiment) Although it considers as the arrangement further than the screening-electrode foil 93 from the detection electrode plate 2 in each above-mentioned example as the heating-wire section 91 is shown in a heater 9 at drawing 4 , it is clear that it is good also as a reverse location configuration.
[0026] Moreover, it sets up more highly than the oscillation frequency of the oscillator circuit 6 of the resonance frequency of the secondary circuit of the joint transformer 8, electrostatic capacity Cs increases by taking a seat, and you may set up so that the resonance frequency of the secondary circuit of the joint transformer 8 may fall and it may be in agreement with the oscillation frequency of an oscillator circuit 6. In this case, the relation in the level of a signal level and the taking-a-seat condition of being inputted into a microcomputer 74 becomes opposite to the above.
[0027] In addition, the circuit containing an oscillator circuit 6, the joint transformer 8, and the detection electrode plate 2 may constitute the oscillator-circuit section, the oscillation of this oscillator-circuit section and quenching may be made to perform according to change of the electrostatic capacity Cs by the existence of taking a seat, and it may be judged with a microcomputer 74. Furthermore, the circuit containing an oscillator circuit 6, the joint transformer 8, and the detection electrode plate 2 may constitute the oscillator-circuit section similarly, the oscillation frequency of this oscillator-circuit section may be changed according to change of the electrostatic capacity Cs by the existence of taking a seat, and it may be judged with a microcomputer 12.

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[Translation done.]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the ** type perspective view showing the example of the taking-a-seat detection equipment for the seats concerning this invention.
[Drawing 2] It is the circuit diagram of the taking-a-seat detection equipment for the seats of drawing 1 .
[Drawing 3] It is the sectional view of the seat of drawing 1 showing a cross section in part.
[Drawing 4] It is the sectional view showing the enlarged section of the detection polar zone 200 of the seat of drawing 3 .
[Drawing 5] It is the sectional view of the seat of other examples showing a cross section in part.
[Drawing 6] It is the sectional view of the seat of other examples showing a cross section in part.
[Drawing 7] It is the ** type perspective view showing an example of the conventional taking-a-seat detection equipment for the seats.
[Drawing 8] It is the sectional view of the seat of drawing 8 showing a cross section in part.
[Drawing 9] It is the ** type perspective view showing the other examples of the conventional taking-a-seat detection equipment for the seats.
[Drawing 10] It is the sectional view of the seat of drawing 9 showing a cross section in part.
[Description of Notations]
1 -- The seat, 2 -- A detection electrode plate, 5 -- For a heater and 91, the heating-wire section (heating element) and 93 are [ a controller and 9 ] a screening-electrode foil.

[Translation done.]